Report on the FCC and IC Testing of the Laerdal Medical AS Model: AED Trainer In accordance with FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN

Product Service

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Prepared for: Laerdal Medical AS
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FCC ID: QHQ-197AEDT
IC: 20263-197AEDT

COMMERCIAL-IN-CONFIDENCE

Date: 2023-02-27
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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Alex Fink	2023-02-27	SIGN-ID 763135
Authorised Signatory	Matthias Stumpe	2023-02-28	SIGN-ID 763891

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT
The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C and ISED Canada RSS-247 and ISED Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Alex Fink	2023-02-27	SIGN-ID 763135

Laboratory Accreditation	Laboratory recognition	ISED Canada test site registration
DAkkS Reg. No. D-PL-11321-11-03 DAkkS Reg. No. D-PL-11321-11-04	Registration No. BNetzA-CAB-16/21-15	3050A-2

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C, ISED Canada RSS-247, Issue 2 (2017-02) and ISED Canada RSS-GEN:2016, Issue 5 (2019-03).

ACCREDITATION
Our BNetzA Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our BNetzA Accreditation.

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Product Service

Contents

Product Service

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Revision	Description of Change	Date of Issue
0	First revision	2023-02-27

Table 1

1.2 Introduction

Applicant	Laerdal Medical AS
Manufacturer	Laerdal Medical AS
Model Number(s)	AED Trainer
Serial Number(s)	3140497-0038 (conducted sample) 3140497-0041 (radiated sample)
Hardware Version(s)	---
Software Version(s)	---
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15C, ISED Canada RSS-247, Issue 2 (2017-02) and ISED Canada RSS-GEN:2016, Issue 5 (2019-03)
Test Plan/Issue/Date	---
Order Number Date	N/A 2023-01-31
Date of Receipt of EUT	2023-02-02
Start of Test	2023-02-06
Finish of Test	2023-02-09
Name of Engineer(s)	Alex Fink
Related Document(s)	ANSI C63.10 (2013)

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1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C and ISED Canada RSS-247 and ISED Canada RSS-GEN is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: Continuously Transmitting				
3.1	15.247 (d), 15.205, 5.5 and 6.13	Spurious Radiated Emissions	Pass	ANSI C63.10 (2013)
3.2	15.205 N/A and 8.10	Restricted Band Edges	Pass	ANSI C63.10 (2013)
3.3	15.247 (d), 5.5 and N/A	Authorised Band Edges	Pass	ANSI C63.10 (2013)
3.4	15.247 (a)(2), 5.2 and 6.6	Emission Bandwidth	Pass	ANSI C63.10 (2013)
3.5	15.247 (e), 5.2 and 6.12	Power Spectral Density	Pass	ANSI C63.10 (2013) KDB 662911 D01 v02r02
3.6	15.247 (b), 5.4 and 6.12	Maximum Conducted Output Power	Pass	ANSI C63.10 (2013) KDB 662911 D01 v02r02
3.7	15.207, N/A and 8.8	AC Power Line Conducted Emissions	N/A	Battery supplied
3.8	RSS-Gen, Issue 5, 6.11	Transmitter frequency stability	Pass	RSS-Gen, Issue 5, April 2018, chapter 6.11

Table 2

Product Service

1.4 Basic information of EUT

Equipment characteristics	
Type designation: Type of equipment:	AED Trainer Automated External Defibrilator (AED) Training
Application: Equipment class: Kind of equipment	Wideband transmission systems Equipment for portable use Transceiver
Frequency band[1]:	3 b
Frequency range:	2400 – 2483.5 MHz
	40
	Internal PCB antenna BLE-Antenna Peak Gain: 1.9 dBi See also test report: TR-713293096-00 +5°C to +35°C No Yes
Marking plate (may only be a draft)	
Is it a product label or PCB label. If product label Please see draft below: 	

[1] Classification according to CEPT/ERC Recommendation 70-03

Product Service

1.5 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer / SN: 3140497-0038 - conducted sample with SMA connector	Not Applicable	Not Applicable

Table 3

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer / SN: 3140497-0041 - radiated sample with internal antenna	Not Applicable	Not Applicable

Table 4

1.6 Test Location

TÜV SÜD Product Service conducted the following tests at our Straubing Test Laboratory.

Test Name	Name of Engineer(s)
Configuration and Mode: Continuously Transmitting	
Spurious Radiated Emissions	Alex Fink
Restricted Band Edges	Alex Fink
Authorised Band Edges	Alex Fink
Emission Bandwidth	Alex Fink
Power Spectral Density	Alex Fink
Maximum Conducted Output Power	Alex Fink
Transmitter frequency stability	Alex Fink

Table 5

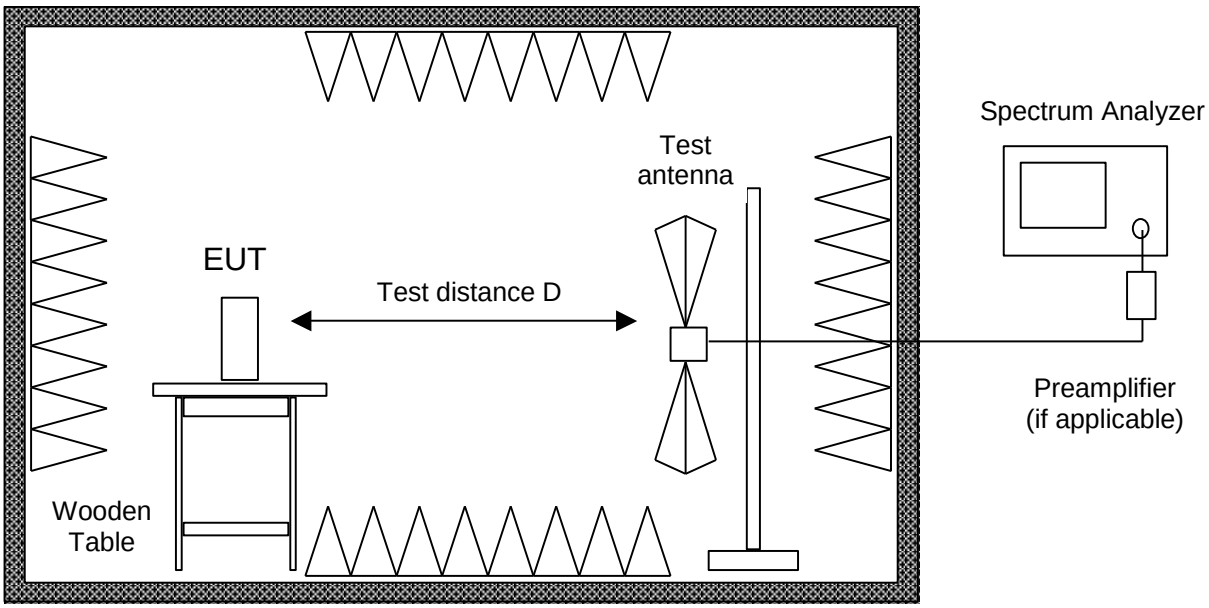
Office Address:

Äußere Frühlingstraße 45
94315 Straubing
Germany

Product Service

2 Test Setup

2.1 Radiated Emission in Fully or Semi Anechoic Room



Fully or semi anechoic room

Radiated emission in fully or semi anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

All tests below 8.2 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance may be reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For final testing below 1 GHz a semi anechoic room complying with the NSA requirements of ANSI C63.4 for alternative test sites is used (see 2.2). If prescans are recorded in fully anechoic room they are indicated appropriately.

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According to section 13 of KDB558074 the requirement for radiated emissions on the band edges was performed with a reduced bandwidth of 100 kHz instead of 1 MHz.

Radiated emission in the frequency range 9 kHz to 30 MHz is measured using an active loop antenna. First the whole spectrum of emission caused by the equipment is recorded at a distance of 3 meters in a fully or semi anechoic room with the detector of the spectrum analyzer or EMI receiver set to peak. This configuration is also used for recording the spectrum of intentional radiators.

Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

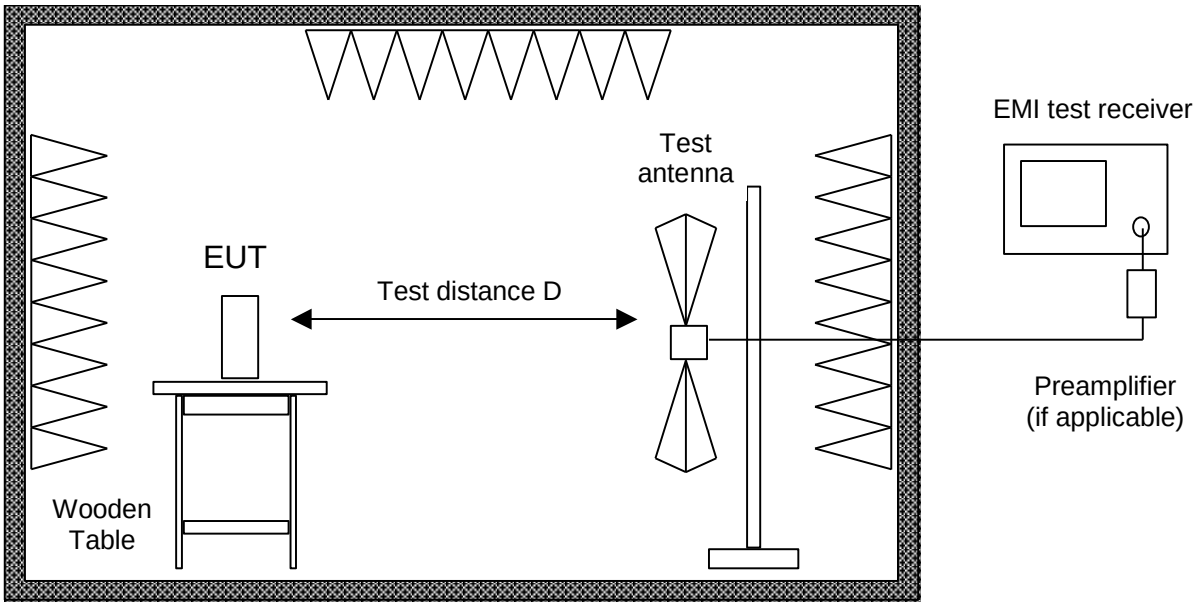
EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.
If worst case emission of the EUT cannot be recorded with EUT in standard position and loop antenna in vertical polarization the EUT (or the radiating part of the EUT) is rotated by 90 degrees instead of changing the loop antenna to horizontal polarization. This procedure is selected to minimize the influence of the environment (e.g. effects caused by the floor especially with longer distances).

Final measurement is performed at a test distance D of 30 meters using an open field test site. In case the regulation requires testing at other distances, the result is extrapolated by either making measurements at an additional distance D of 10 meters to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). In cases of very low emissions measurements are performed at shorter distances and results are extrapolated to the required distance. The provisions of CFR 47 Part 15 sections 15.31(d) and (f)(2) apply. According to CFR 47 Part 15 section 15.209(d) final measurement is performed with detector function set to quasi-peak except for the frequency bands 9 to 90 kHz and 110 to 490 kHz where, for non-pulsed operation, average detector is employed.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Product Service

2.2 Radiated Emission at Alternative Test Site



Alternate test site (semi anechoic room)

Radiated emission in the frequency range 30 MHz to 1 GHz is measured within a semi-anechoic room with groundplane complying with the NSA requirements of ANSI C63.4 for alternative test sites. A linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna") is used. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in fully anechoic room.

If no prescan in a fully anechoic room is used first a peak scan is performed in four positions to get the whole spectrum of emission caused by EUT with the measuring antenna raised and lowered from 1 to 4 m to find table position, antenna height and antenna polarization for the maximum emission levels. Data reduction is applied to these results to select those levels having less margin than 10 dB to or exceeding the limit using subranges and limited number of maximums. Further maximization is following.
With detector of the test receiver set to quasi-peak final measurements are performed immediately after frequency zoom (for drifting disturbances) and maximum adjustment.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

In cases where prescans in a fully anechoic room are taken (e. g. if EUT is operating for a short time only or battery is dircharged quickly) final measurements with quasi-peak detector are performed manually at frequencies indicated by prescan with EUT rotating all around and receiving antenna raising and lowering within 1 meter to 4 meters to find the maximum levels of emission.
Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

Product Service

For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.

Product Service

3 Test Details

3.1 Spurious Emissions

3.1.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.247 (d), 15.205, 5.5 and 6.13

3.1.2 Equipment Under Test and Modification State

AED Trainer, S/N: 3140497-0038 - Modification State 0
AED Trainer, S/N: 3140497-0041 - Modification State 0

3.1.3 Date of Test

2023-02-06

3.1.4 Test Method

Plots for average measurements were taken in accordance with ANSI C63.10-2013 clause 4.1.4.2.3 to characterize the EUT. Where emissions were detected, final average measurements were taken in accordance with ANSI C63.10-2013 clause 4.1.4.2.2.

The plots shown are the characterization of the EUT. The limits on the plots represent the most stringent case for restricted bands, (54/74 dBuV/m) when compared to 20 dBc outside restricted bands. The limits shown have been used as a threshold to determine where further measurements are necessary. Where results are within 10 dB of the limits shown on the plots, further investigation was carried out and reported in results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

3.1.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	30.0 %

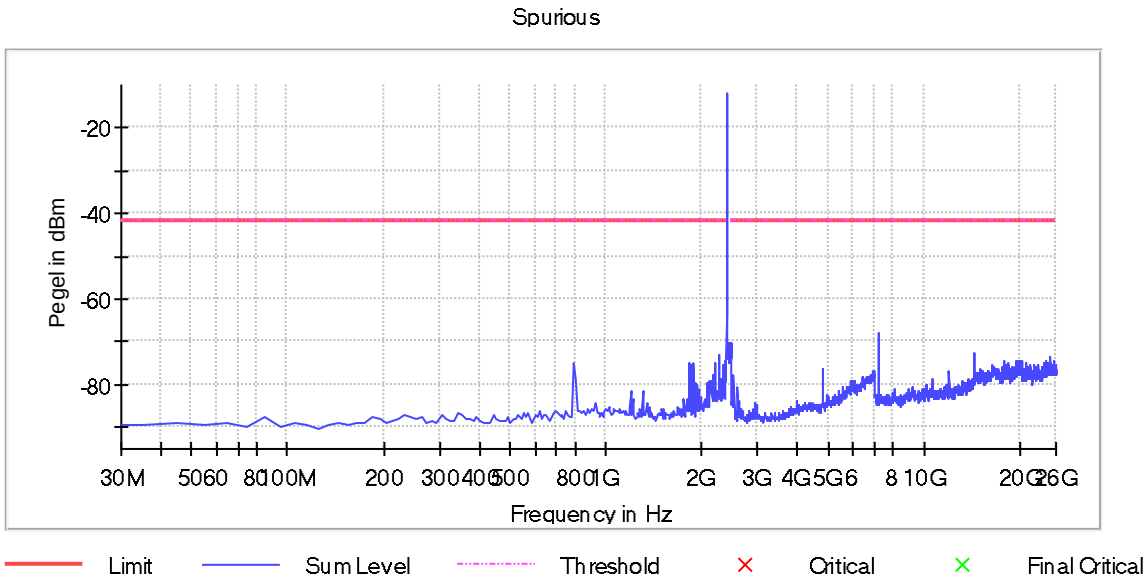
3.1.6 Test Results

Sample calculation of final values:

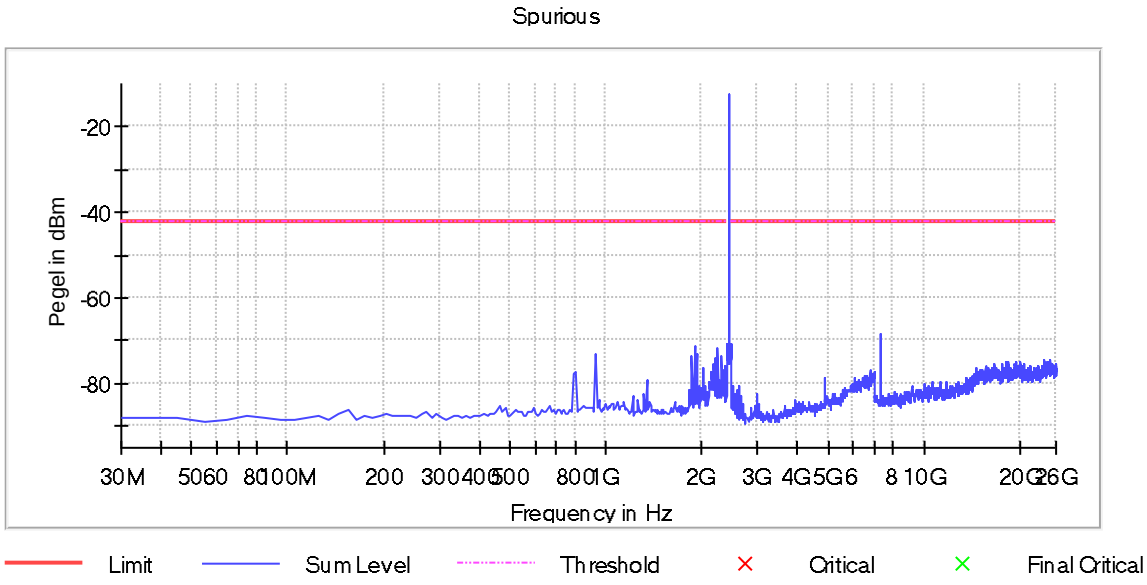
Final Value (dBµV/m) = Reading Value (dBµV) + Cable Correction Factor (dB) + Antenna Correction Factor (dB/m)

Product Service

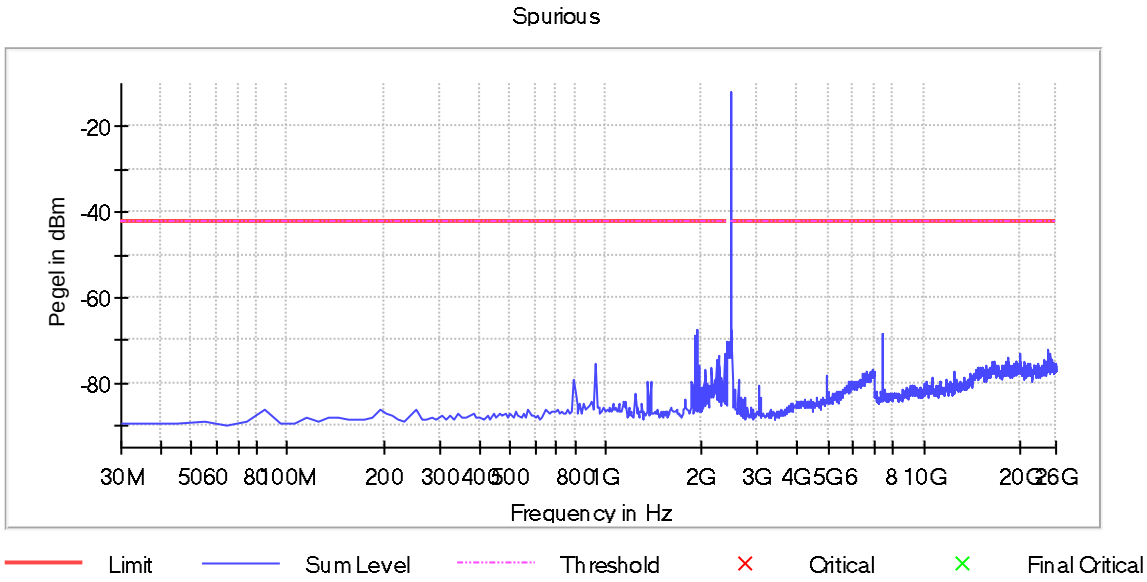
Transmission on 2402 MHz (BLE), conducted measurement:



Transmission on 2440 MHz (BLE), conducted measurement:



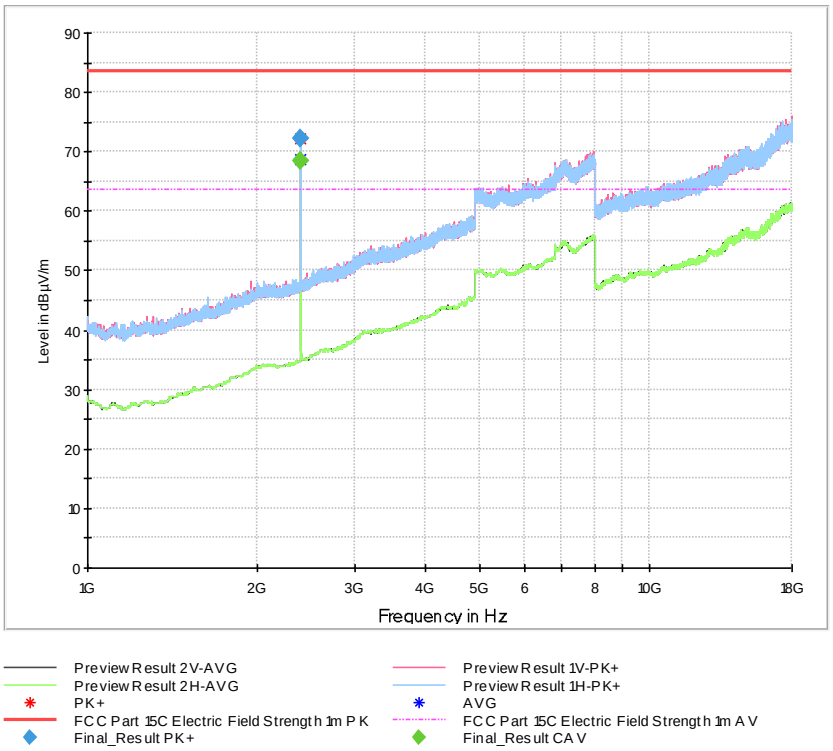
Transmission on 2480 MHz (BLE), conducted measurement:



Product Service

Transmission on 2402 MHz (BLE), radiated measurement - Preliminary pre-scans for the worst-case orientation:

x axis

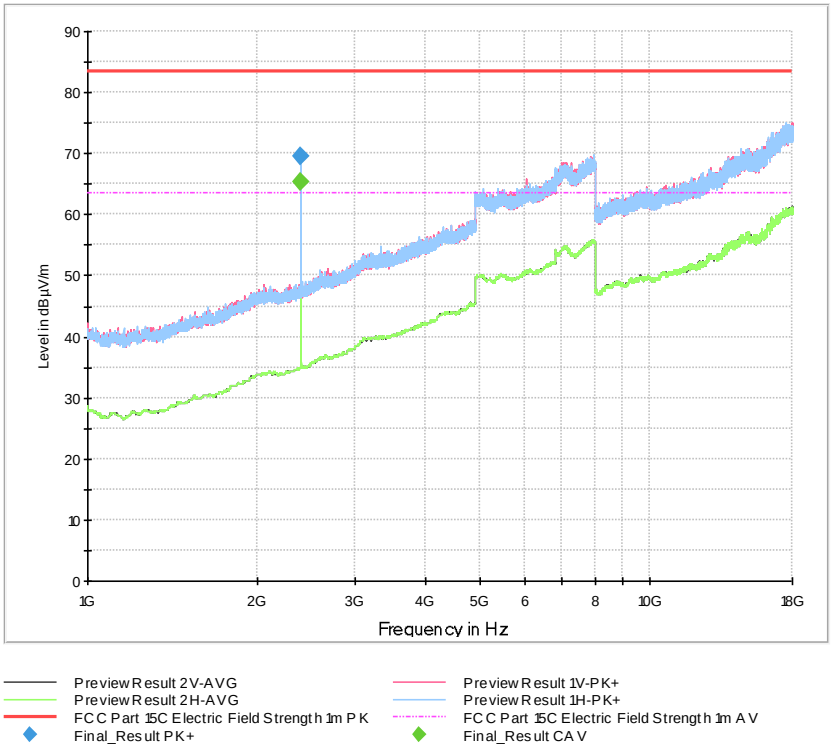


Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
2401.750000	---	68.41	---	---	1000.0	1000.000	146.0	H	137.0	33.9
2401.750000	72.31	---	---	---	1000.0	1000.000	146.0	H	137.0	33.9

Product Service

y axis

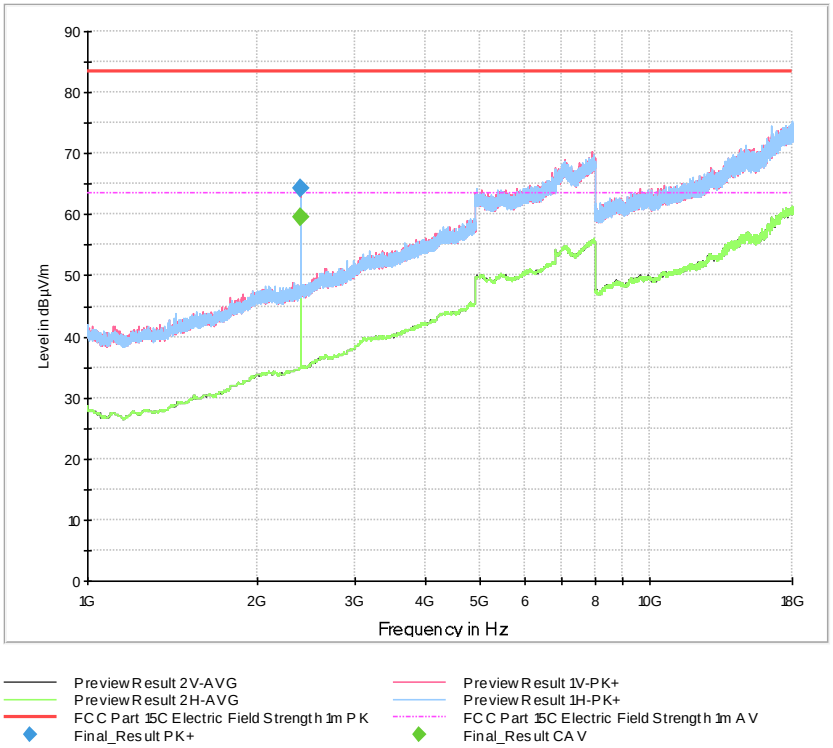


Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
2401.750000	---	65.37	---	---	1000.0	1000.000	150.0	H	-89.0	33.9
2401.750000	69.45	---	---	---	1000.0	1000.000	150.0	H	-89.0	33.9

Product Service

z axis

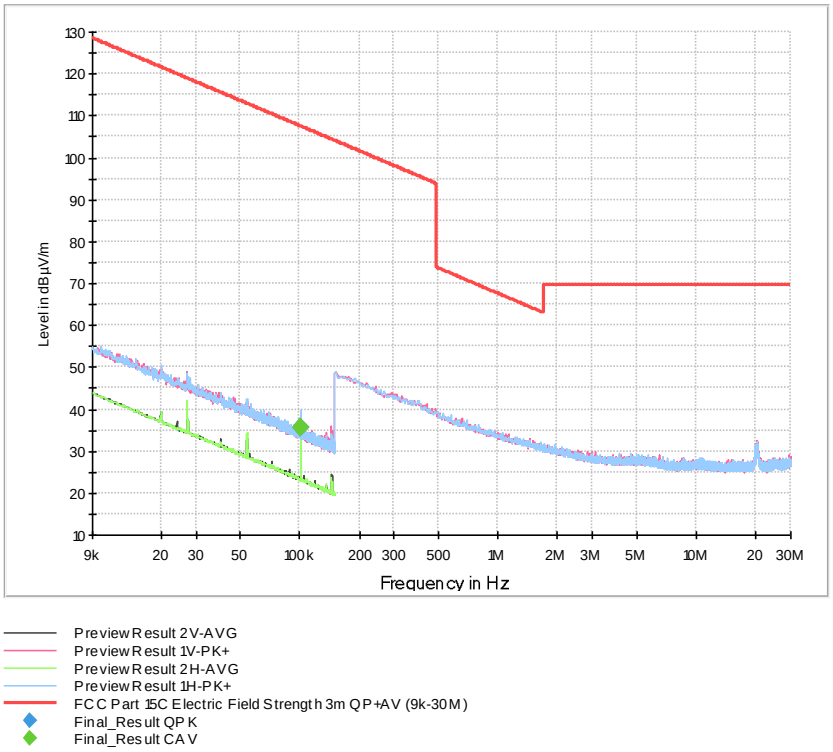


Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
2401.750000	---	59.62	---	---	1000.0	1000.000	155.0	V	2.0	33.9
2401.750000	64.30	---	---	---	1000.0	1000.000	155.0	V	2.0	33.9

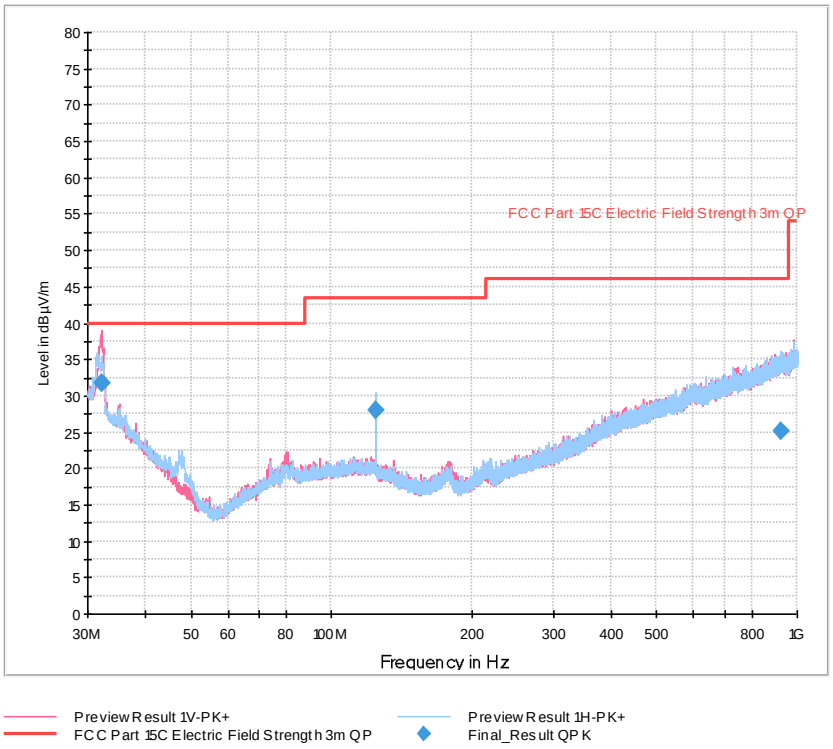
Product Service

Transmission on 2402 MHz (BLE), radiated measurement - final measurement in x axis:



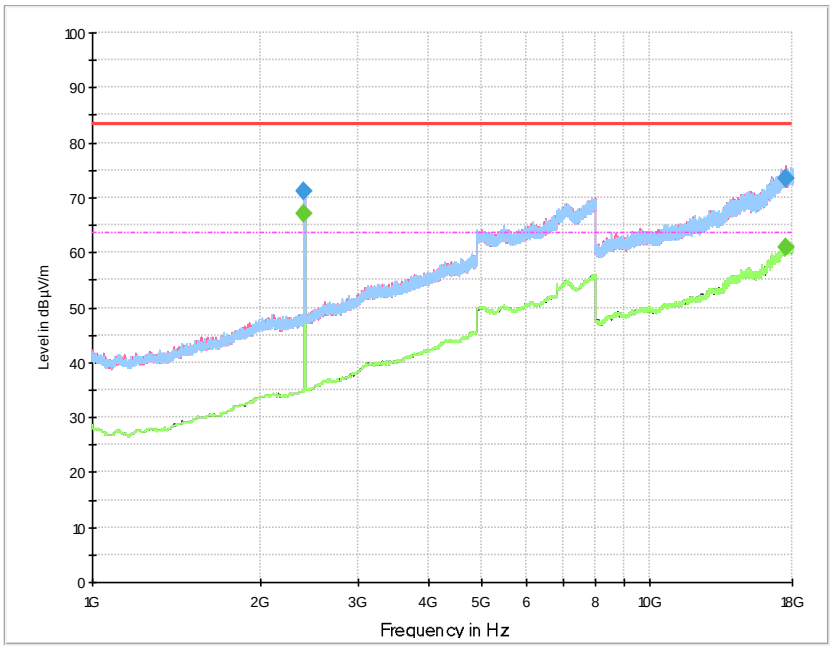
Final Results:

Frequency *MHz*	*QuasiPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
0.101550	---	35.51	---	---	1000.0	0.200	100.0	H	-101.0	19.3
0.101550	35.59	---	107.47	71.88	1000.0	0.200	100.0	H	-101.0	19.3



Final Results:

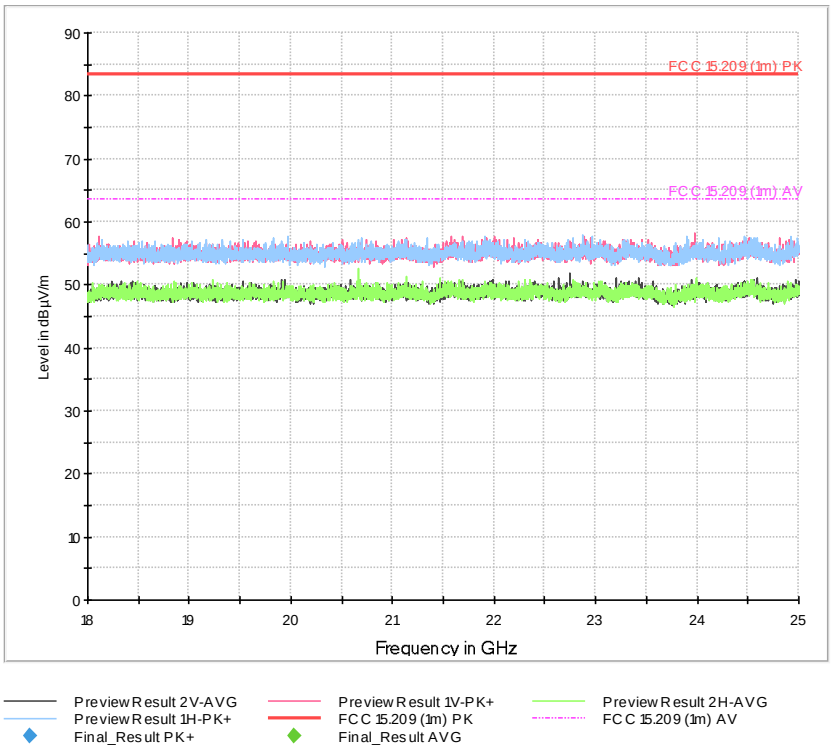
Frequency *MHz*	*QuasiPeak* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB/m*
32.160000	31.82	40.00	8.18	1000.0	120.000	100.0	V	12.0	24.1
125.010000	27.98	43.50	15.52	1000.0	120.000	154.0	H	11.0	17.1
923.700000	25.08	46.02	20.94	1000.0	120.000	366.0	H	83.0	30.8



Final Results:

Frequency *MHz*	*MaxPeak* *dBµV/m*	*CAverage* *dBµV/m*	*Limit* *dBµV/m*	*Margin* *dB*	*Meas. Time* *ms*	*Bandwidth* *kHz*	*Height* *cm*	*Pol*	*Azimuth* *deg*	*Corr.* *dB*
2401.750000	---	67.03	#1	#1	1000.0	1000.000	133.0	V	-101.0	33.9
2401.750000	70.99	---	#1	#1	1000.0	1000.000	133.0	V	-101.0	33.9
17538.750000	---	60.80	63.50	2.70	1000.0	1000.000	142.0	V	-14.0	58.4
17538.750000	73.60	---	83.50	9.90	1000.0	1000.000	142.0	V	-14.0	58.4

Note: #1 intentional radiation


90
80
70
60
50
40
30
20
10
0
18
19
20
21
22
23
24
25
Level in dBµV/m
Frequency in GHz
FCC 15.209 (1m) PK
FCC 15.209 (1m) AV
Preview Result 2V-AVG
Preview Result 1H-PK+
Final_Result PK+
Preview Result 1V-PK+
FCC 15.209 (1m) PK
Final_Result AVG
Preview Result 2H-AVG
FCC 15.209 (1m) AV

Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in 15.209(a)

ISED Canada RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

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3.1.7 Test Location and Test Equipment Used

Radiated Tests were carried out in cabin No.11 and conducted tests were carried out with test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2024-04-30
Double ridged horn antenna	Rohde & Schwarz	HF907	40089	24	2023-02-28
Loop antenna	Schwarzbeck	FMZB 1519 B	44334	36	2023-02-28
ULTRALOG Antenna	Rohde & Schwarz	HL562E	39969	36	2025-03-31
Horn Antenna with preamplifier	Rohde & Schwarz	A-INFOMW LB-180400H-KF+ TS-	43661	24	2025-01-17
EMC measurement software	Rohde & Schwarz	EMC32 Emission K11 - V10.50.10	42986	---	---
Semi Anechoic Room	Frankonia	Cabin No. 11	42961	36	2024-09-30
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	24	2024-02-29
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2026-01-31
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2024-12-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	36	2023-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	36	2023-11-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 6

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.2 Restricted Band Edges

3.2.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.205 N/A and 8.10

3.2.2 Equipment Under Test and Modification State

AED Trainer, S/N: 3140497-0038 - Modification State 0
AED Trainer, S/N: 3140497-0041 - Modification State 0

3.2.3 Date of Test

2023-02-06 and 2023-02-07

3.2.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 6.10.5.

Plots for average measurements were taken in accordance with ANSI C63.10 clause 4.1.4.2.3. These are shown for information purposes and were used to determine the worst case measurement point. Final average measurements were then taken in accordance with ANSI C63.10 clause 4.1.4.2.2. to obtain the measurement result recorded in the test results tables.

The following conversion can be applied to convert from dBµV/m to µV/m:
10^(Field Strength in dBµV/m/20).

3.2.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	33.0 %

3.2.6 Test Results

Results are shown in chapter 2.1

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength (µV/m at 3 m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 7

ISED Canada RSS-GEN, Limit Clause 8.9

Frequency (MHz)	Field Strength (µV/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960*	500

Table 8

*Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Product Service

3.2.7 Test Location and Test Equipment Used

Radiated Tests were carried out in FAR No.11

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
EMI test receiver	Rohde & Schwarz	ESW44	39897	12	2024-04-30
Double ridged horn antenna	Rohde & Schwarz	HF907	40089	24	2023-02-28
Loop antenna	Schwarzbeck	FMZB 1519 B	44334	36	2023-02-28
ULTRALOG Antenna	Rohde & Schwarz	HL562E	39969	36	2025-03-31
Horn Antenna with preamplifier	Rohde & Schwarz	A-INFOMW LB-180400H-KF+ TS-	43661	24	2025-01-17
EMC measurement software	Rohde & Schwarz	EMC32 Emission K11 - V10.50.10	42986	---	---
Semi Anechoic Room	Frankonia	Cabin No. 11	42961	36	2024-09-30

Table 9

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.3 Authorised Band Edges

3.3.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.247 (d), 5.5 and N/A

3.3.2 Equipment Under Test and Modification State

AED Trainer, S/N: 3140497-0038 - Modification State 0

3.3.3 Date of Test

2023-02-06

3.3.4 Test Method

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Meas Guidance v05 8.7 and ANSI C63.10-2013

3.3.5 Environmental Conditions

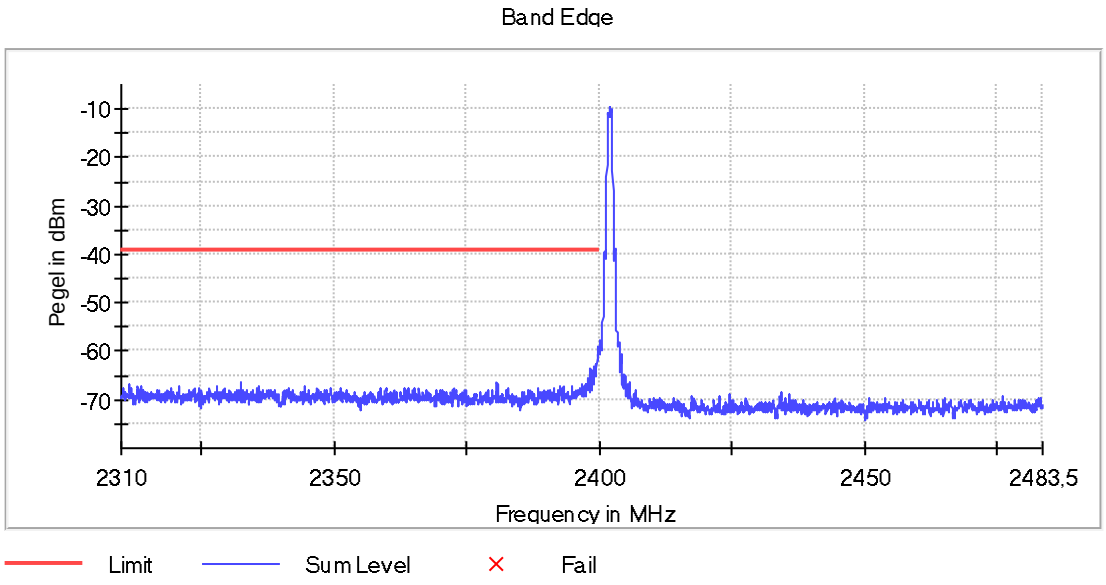
Ambient Temperature	20.0 °C
Relative Humidity	30.0 %

3.3.6 Test Results

Product Service

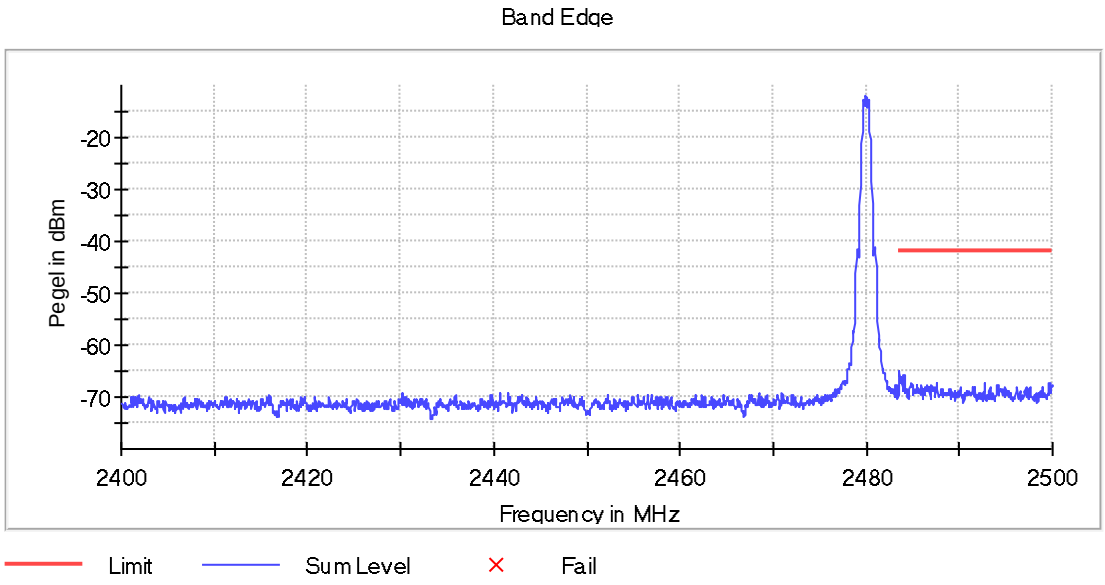
Transmission on 2402 MHz (BLE)

Band Edge Low



Transmission on 2480 MHz (BLE)

Band Edge High



Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (d)

20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

ISED Canada RSS-247, Limit Clause 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

3.3.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	24	2024-02-29
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2026-01-31
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2024-12-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	36	2023-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	36	2023-11-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 10

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.4 Emission Bandwidth

3.4.1 Specification Reference

FCC 47 CFR Part 15C, ISED Canada RSS-247 and ISED Canada RSS-GEN, Clause 15.247 (a)(2), 5.2 and 6.6

3.4.2 Equipment Under Test and Modification State

AED Trainer, S/N: 3140497-0038 - Modification State 0

3.4.3 Date of Test

2023-02-06

3.4.4 Test Method

Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 11.8.1

3.4.5 Environmental Conditions

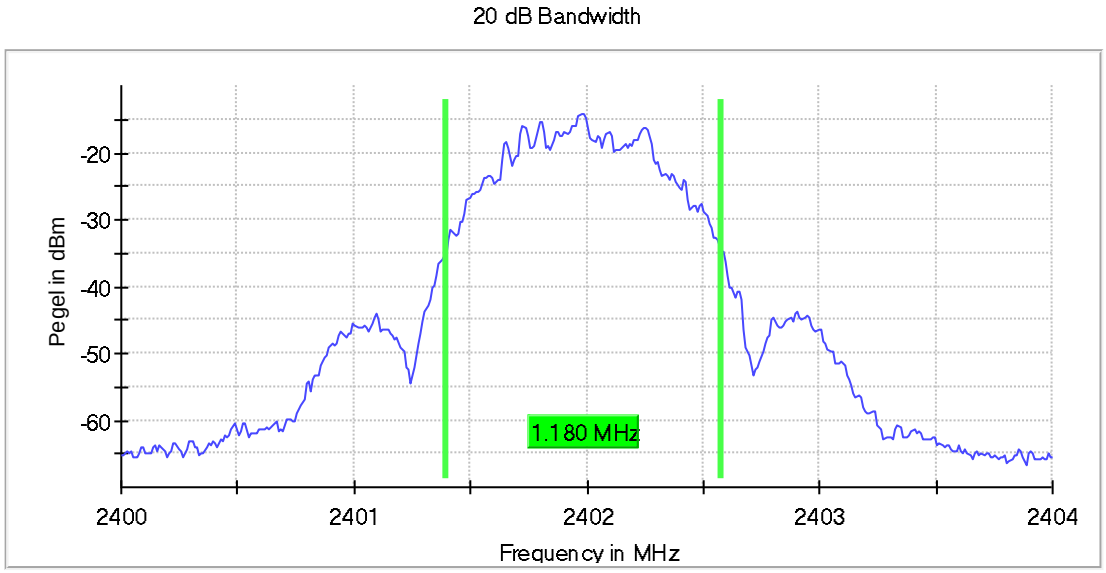
Ambient Temperature	20.0 °C
Relative Humidity	30.0 %

3.4.6 Test Results

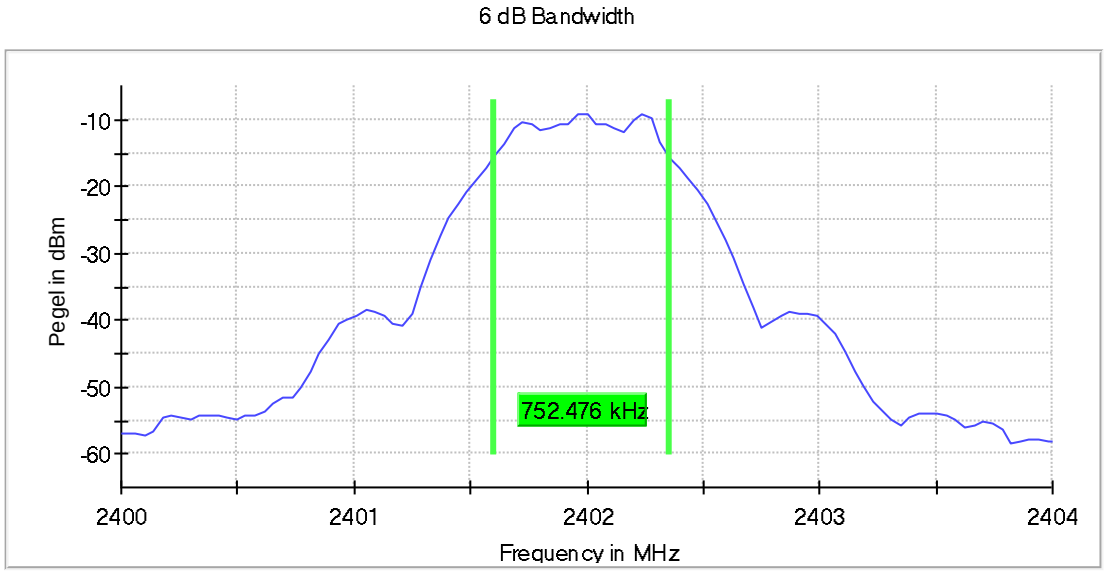
Operating Mode	Frequency (MHz)	20 dB Bandwidth (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit
BLE	2402	1.180	0.752	1.050	≥ 500 kHz
BLE	2440	1.180	0.752	1.050	≥ 500 kHz
BLE	2480	1.180	0.752	1.060	≥ 500 kHz

Product Service

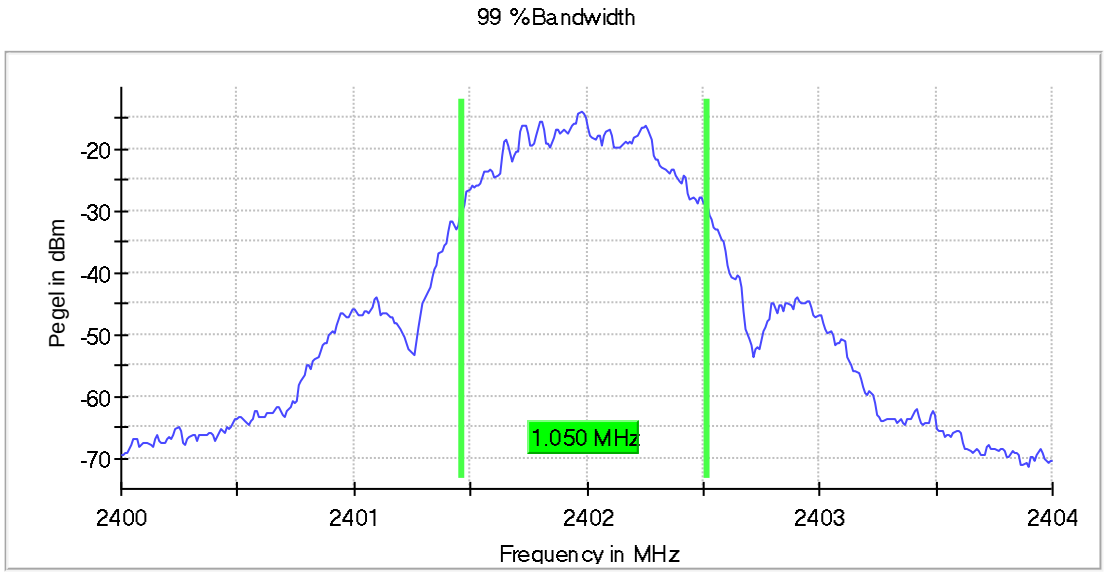
Transmission on 2402 MHz (BLE)



20dB-BW, 2402 MHz, BLE



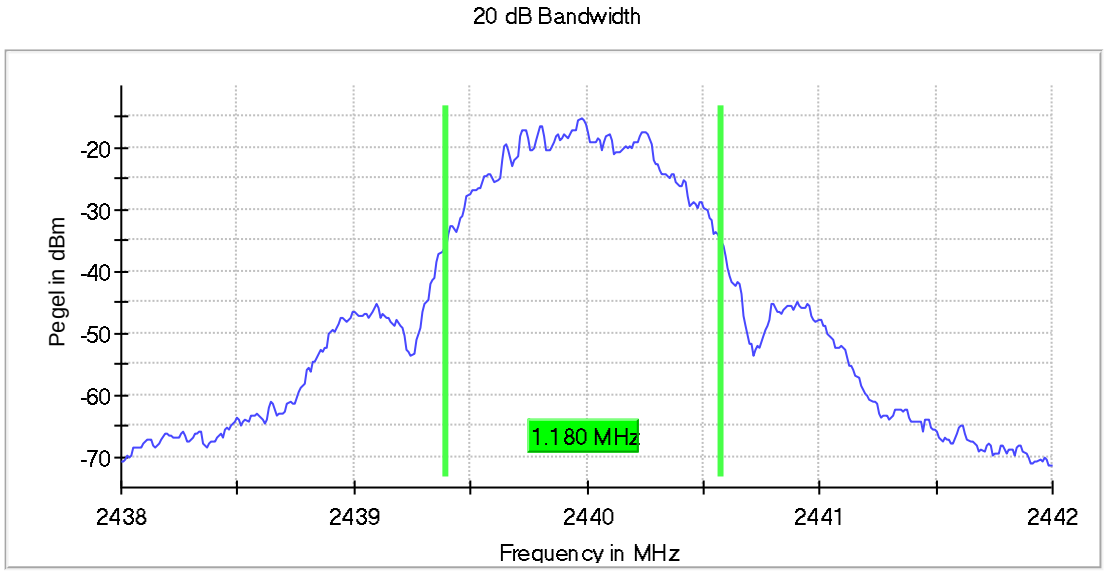
6dB-BW, 2402 MHz, BLE



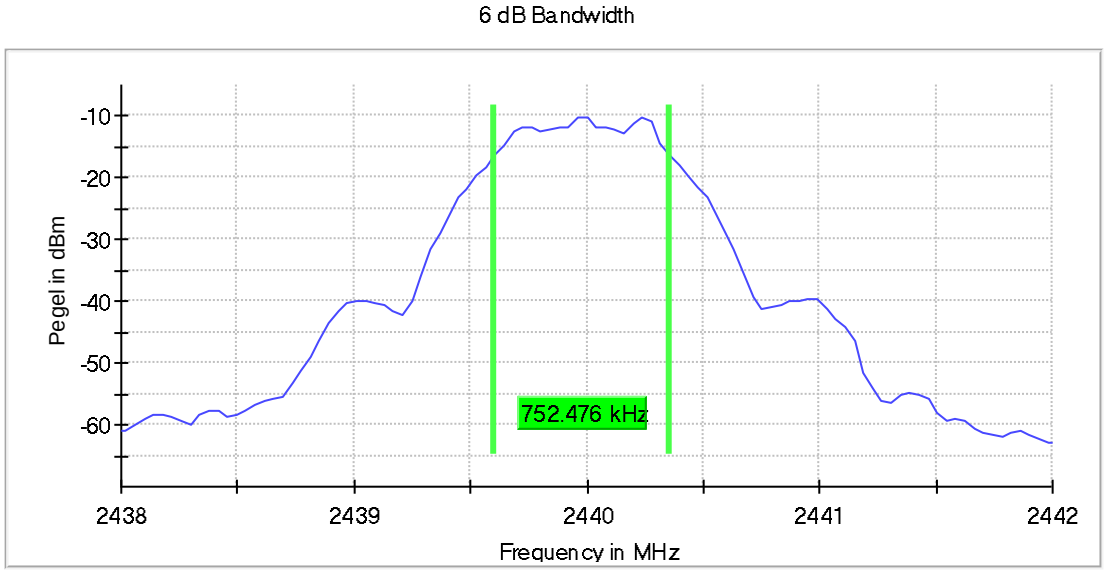
99%-BW, 2402 MHz, BLE

Product Service

Transmission on 2440 MHz (BLE)

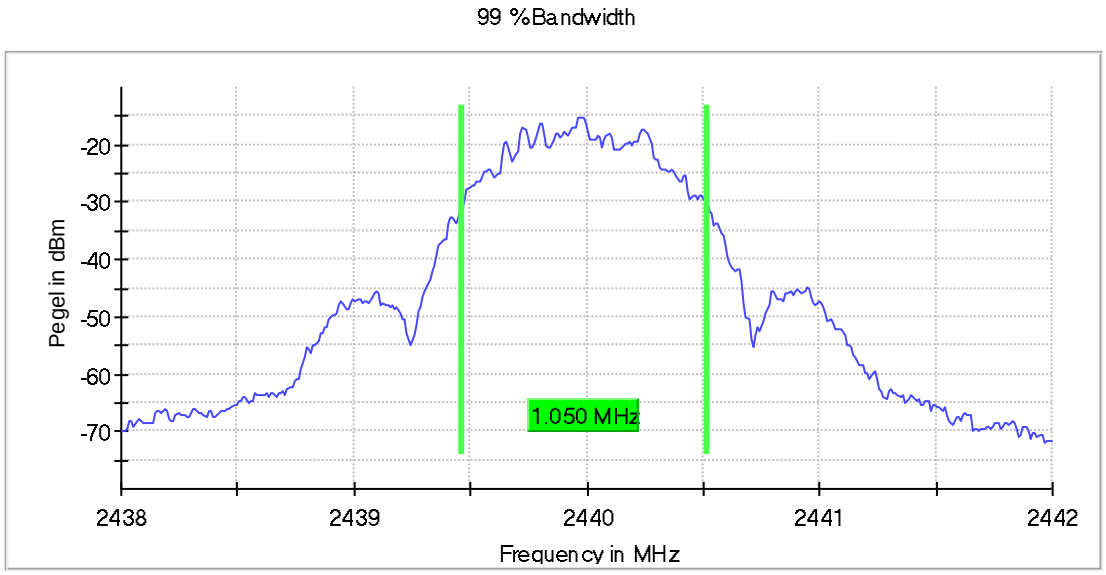


20dB-BW, 2440 MHz, BLE



6dB-BW, 2440 MHz, BLE

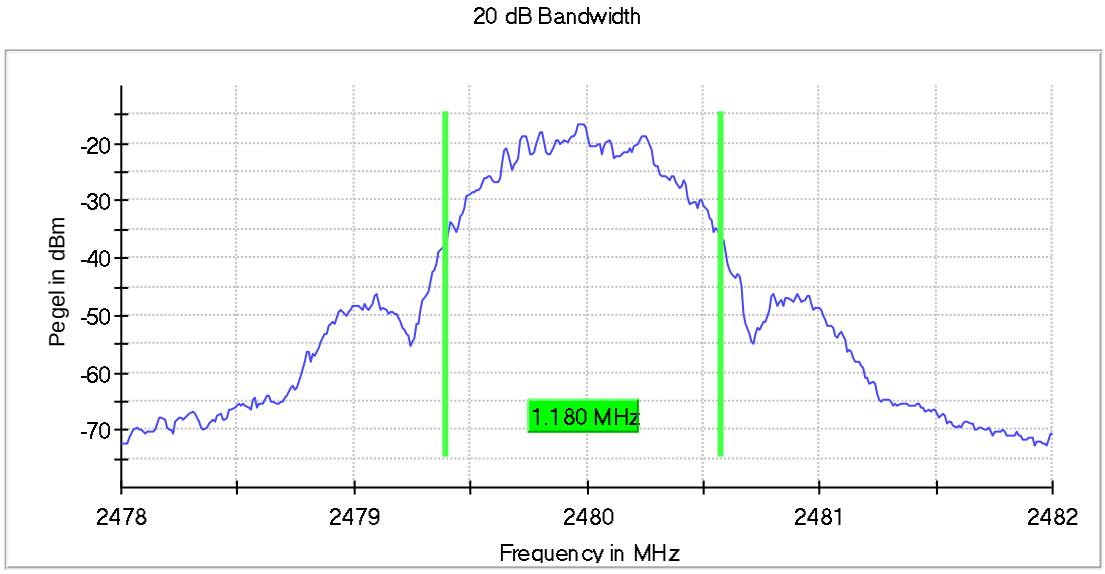
Product Service



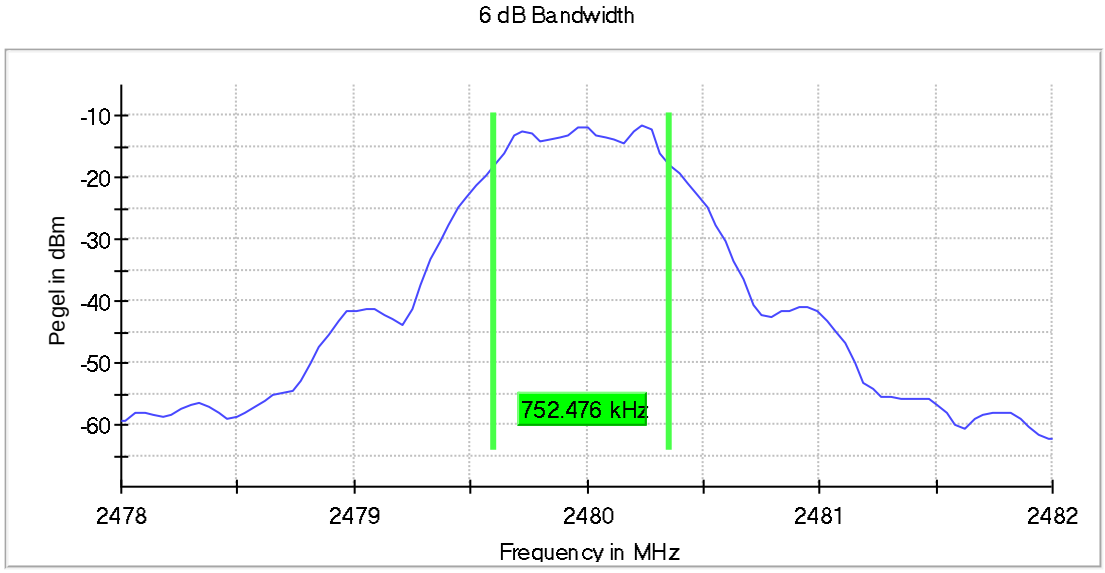
99%-BW, 2440 MHz, BLE

Product Service

Transmission on 2480 MHz (BLE)

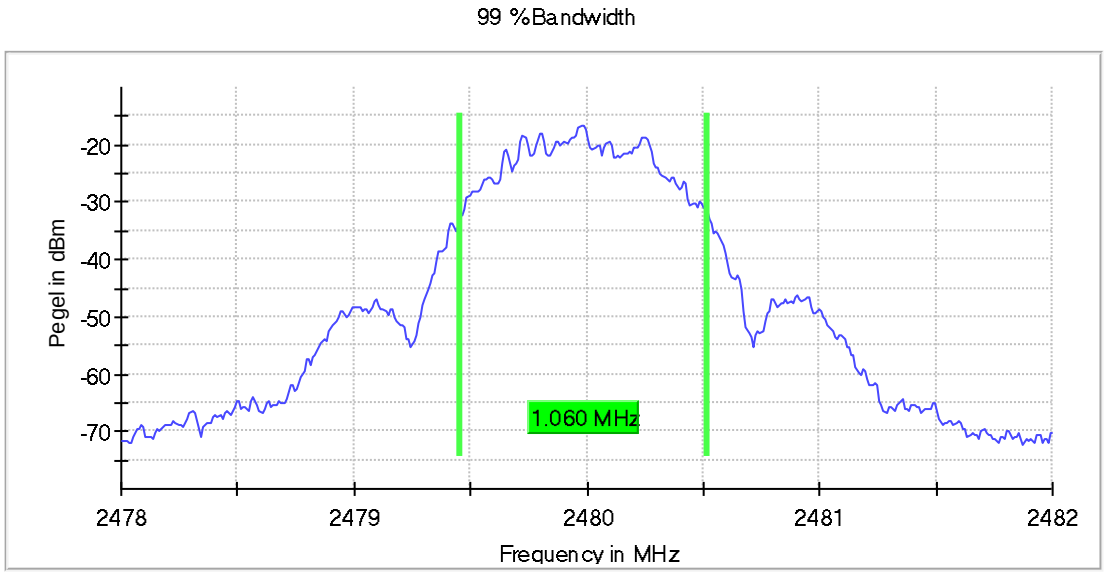


20dB-BW, 2480 MHz, BLE



6dB-BW, 2480 MHz, BLE

Product Service



99%-BW, 2480 MHz, BLE

Product Service

FCC 47 CFR Part 15, Limit Clause 15.247(a)(2) and ISED Canada RSS-247, Clause 5.2(a)

The minimum 6 dB Bandwidth shall be at least 500 kHz.

3.4.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	24	2024-02-29
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2026-01-31
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2024-12-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	36	2023-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	36	2023-11-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 11

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.5 Power Spectral Density

3.5.1 Specification Reference

Test according to FCC title 47 part 15 §15.247(a), (e), KDB 558074 D01 DTS Meas Guidance v05 F and ANSI C63.10-2013

3.5.2 Equipment Under Test and Modification State

AED Trainer, S/N: 3140497-0038 - Modification State 0

3.5.3 Date of Test

2023-02-06

3.5.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.10.2.

3.5.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	30.0 %

3.5.6 Test Results

Operating Mode	Frequency (MHz)	PSD (dBm)	Limit (dBm)
BLE	2402	-19.58	8.0
BLE	2440	-20.45	8.0
BLE	2480	-22.00	8.0

Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

ISED Canada RSS-247, Limit Clause 5.2(b)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

3.5.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	24	2024-02-29
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2026-01-31
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2024-12-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	36	2023-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	36	2023-11-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 12

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.6 Maximum Conducted Output Power

3.6.1 Specification Reference

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v05 and ANSI C63.10-2013 11.9.2.3.2

3.6.2 Equipment Under Test and Modification State

AED Trainer, S/N: 3140497-0038 - Modification State 0

3.6.3 Date of Test

2023-02-06

3.6.4 Test Method

This test was performed in accordance with ANSI C63.10, clause 11.9.1.1.

3.6.5 Environmental Conditions

Ambient Temperature	20.0 °C
Relative Humidity	30.0 %

Product Service

3.6.6 Test Results

Operating Mode	Frequency (MHz)	Peak Power e.i.r.p (dBm)	Limit Max (dBm)
BLE	2402	-5.1	30
BLE	2440	-6.0	30
BLE	2480	-7.2	30

Note: Antenna gain of 1.9 dBi already added to Peak Power e.i.r.p results.

FCC 47 CFR Part 15, Limit Clause 15.247 (b)(3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

ISED Canada RSS-247, Limit Clause 5.4 (b)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e) of the specification.

3.6.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	24	2024-02-29
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2026-01-31
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2024-12-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	36	2023-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	36	2023-11-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 13

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

3.7 Transmitter frequency stability

3.7.1 Specification Reference

RSS-Gen, Issue 5, April 2018 (General Requirements for Compliance of Radio Apparatus)

3.7.2 Equipment Under Test and Modification State

AED Trainer, S/N: 3140497-0038 - Modification State 0

3.7.3 Date of Test

2023-02-09

3.7.4 Test Method

RSS-Gen, Issue 5, March 2019, chapter 6.11

3.7.5 Environmental Conditions

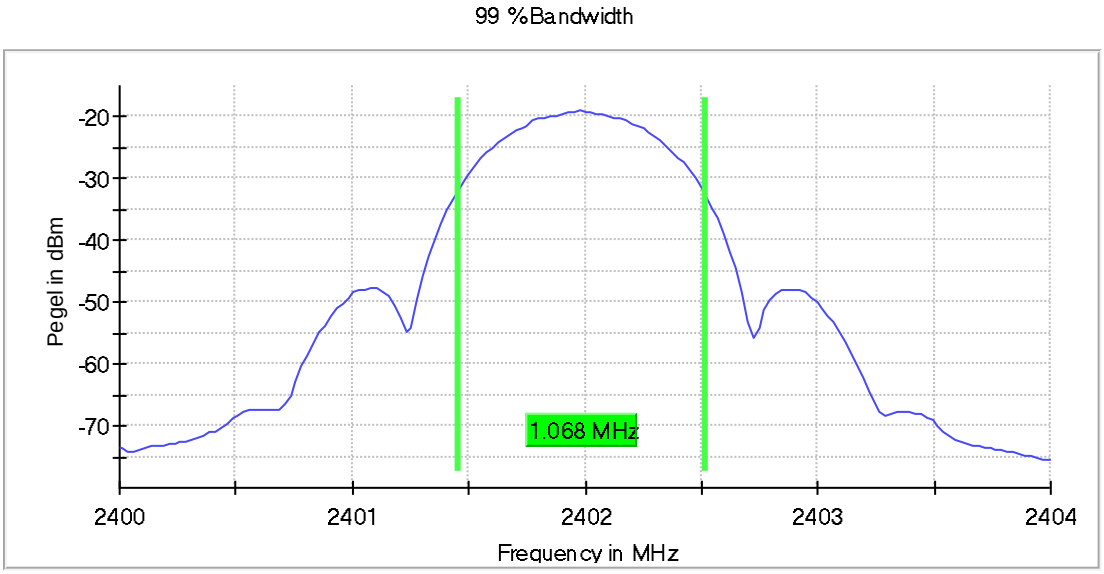
Ambient Temperature	23.0 °C
Relative Humidity	36.0 %

Product Service

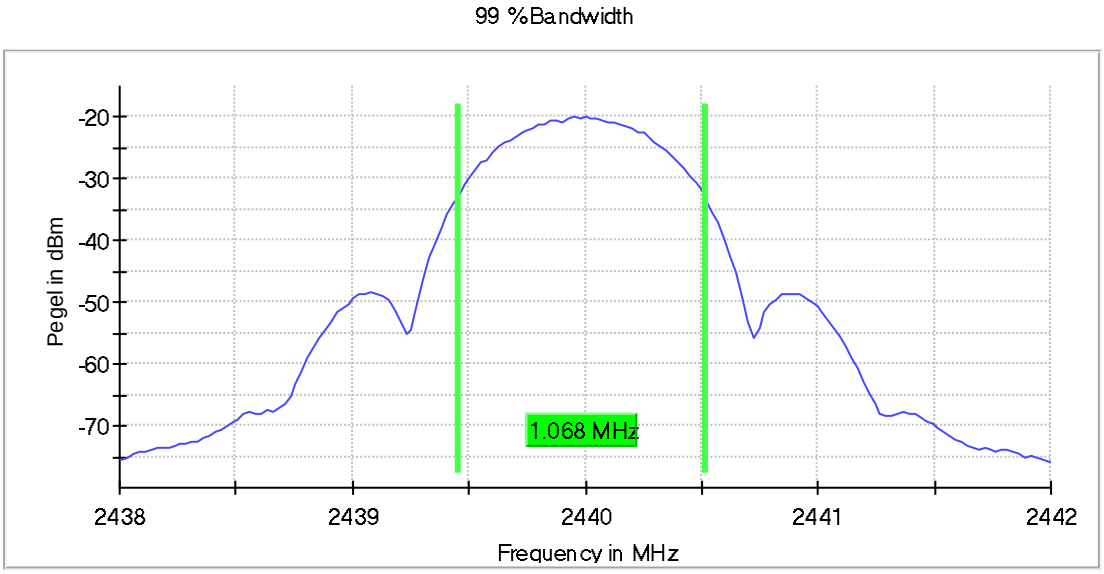
3.7.6 Test Results

Note: - Measured Frequency Error does not affect any band edge requirements.
- Measurement was performed with modulated transmitter signal

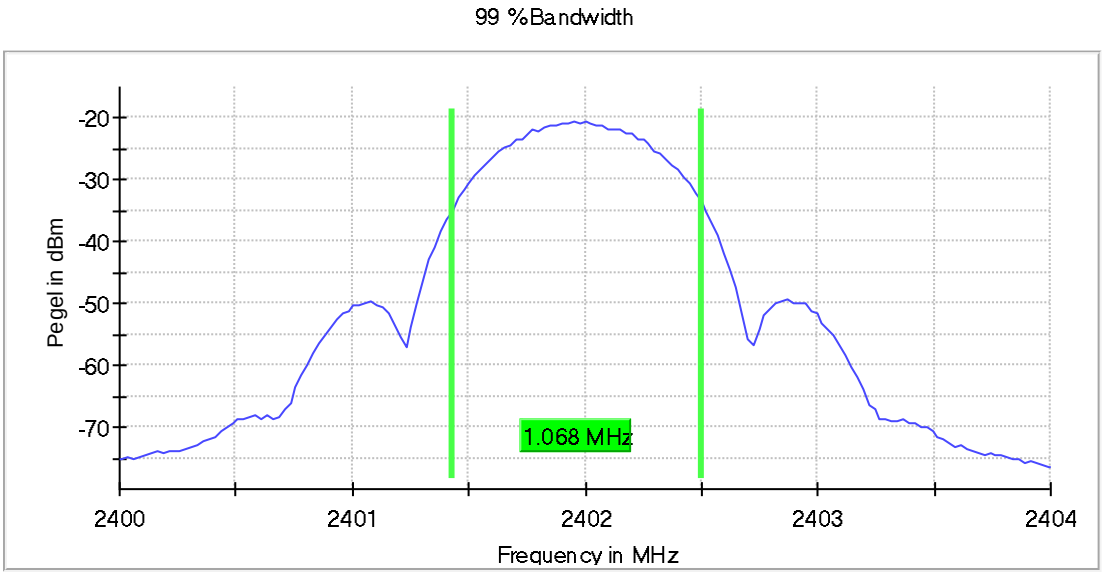
Sample screenshots:



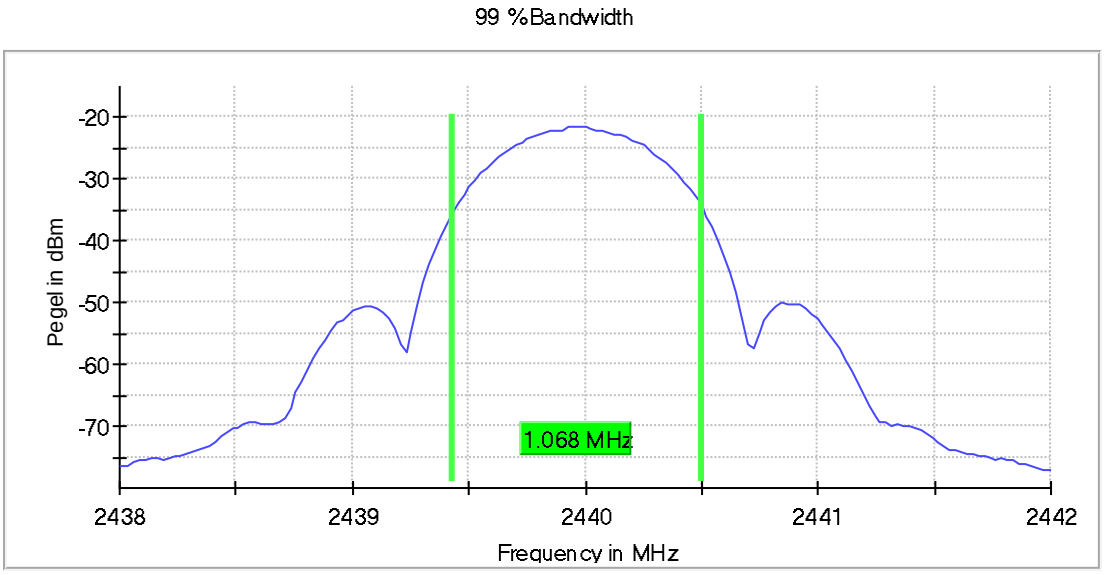
Transmission on 2402 MHz; - 30°C, 1.5 V DC



Transmission on 2480 MHz; - 30°C, 1.5 V DC



Transmission on 2402 MHz; + 50°C, 1.5 V DC



Transmission on 2480 MHz; + 50°C, 1.5 V DC

Product Service

3.7.7 Test Location and Test Equipment Used

Conducted test was carried out in Non-shielded room with Test system TS8997.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	FSV40	20219	24	2024-02-29
Vector Signal Generator	Rohde & Schwarz	SMBV100A	20238	36	2026-01-31
Signal Generator	Rohde & Schwarz	SMB100A	20215	36	2024-12-31
Switching Device	Rohde & Schwarz	OSP120 I	20248	36	2023-02-28
Switching Device	Rohde & Schwarz	OSP120 II	38807	36	2023-11-30
EMC Measurement Software	Rohde & Schwarz	EMC32 TS8997 - V10.50.00	44381	---	---

Table 14

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment
N/A - Not Applicable

Product Service

4 Photographs

4.1 Test Setup Photos

See Annex.

Product Service

5 Measurement Uncertainty

The measurement uncertainty in the laboratory is less than or equal to the maximum measurement uncertainty according to EN 55016-4-2: 2011 + A1 + A2 + AC and CISPR16-4-2: 2011 + A1 + A2 + Cor1 (UCISPR). This normative regulation means that the measured value is also the value to be assessed in relation to the limit value.

For a 95% confidence level, the measurement uncertainties for defined systems are:

Radio Testing			
Test Name	kp	Expanded Uncertainty	Note
Occupied Bandwidth	2.0	±1.14 %	2
RF-Frequency error	1.96	±1 · 10-7	7
RF-Power, conducted carrier	2	±0.079 dB	2
RF-Power uncertainty for given BER	1.96	+0.94 dB / -1.05	7
RF power, conducted, spurious emissions	1.96	+1.4 dB / -1.6 dB	7
RF power, radiated			
25 MHz – 4 GHz	1.96	+3.6 dB / -5.2 dB	8
1 GHz – 18 GHz	1.96	+3.8 dB / -5.6 dB	8
18 GHz – 26.5 GHz	1.96	+3.4 dB / -4.5 dB	8
40 GHz – 170 GHz	1.96	+4.2 dB / -7.1 dB	8
Spectral Power Density, conducted	2.0	±0.53 dB	2
Maximum frequency deviation			
300 Hz – 6 kHz	2	±2,89 %	2
6 kHz – 25 kHz	2	±0.2 dB	2
Maximum frequency deviation for FM	2	±2,89 %	2
Adjacent channel power 25 MHz – 1 GHz	2	±2.31 %	2
Temperature	2	±0.39 K	4
(Relative) Humidity	2	±2.28 %	2
DC- and low frequency AC voltage			
DC voltage	2	±0.01 %	2
AC voltage up to 1 kHz	2	±1.2 %	2
Time	2	±0.6 %	2

Table 15

Radio Interference Emission Testing			
Test Name	kp	Expanded Uncertainty	Note
Conducted Voltage Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
100 kHz to 200 MHz (50Ω/5µH AMN)	2	± 3.6 dB	1
Discontinuous Conducted Emission			
9 kHz to 150 kHz (50Ω/50µH AMN)	2	± 3.8 dB	1
150 kHz to 30 MHz (50Ω/50µH AMN)	2	± 3.4 dB	1
Conducted Current Emission			
9 kHz to 200 MHz	2	± 3.5 dB	1
Magnetic Fieldstrength			
9 kHz to 30 MHz (with loop antenna)	2	± 3.9 dB	1
9 kHz to 30 MHz (large-loop antenna 2 m)	2	± 3.5 dB	1
Radiated Emission			
Test distance 1 m (ALSE)			
9 kHz to 150 kHz	2	± 4.6 dB	1
150 kHz to 30 MHz	2	± 4.1 dB	1
30 MHz to 200 MHz	2	± 5.2 dB	1
200 MHz to 2 GHz	2	± 4.4 dB	1
2 GHz to 3 GHz	2	± 4.6 dB	1
Test distance 3 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 5.0 dB	1
1 GHz to 6 GHz	2	± 4.6 dB	1
Test distance 10 m			
30 MHz to 300 MHz	2	± 4.9 dB	1
300 MHz to 1 GHz	2	± 4.9 dB	1
Radio Interference Power			
30 MHz to 300 MHz	2	± 3.5 dB	1
Harmonic Current Emissions			4
Voltage Changes, Voltage Fluctuations and Flicker			4

Table 16

Immunity Testing			
Test Name	kp	Expanded Uncertainty	Note
Electrostatic Discharges			4
Radiated RF-Field			
Pre-calibrated field level	2	+32.2 / -24.3 %	5
Dynamic feedback field level	2.05	+21.2 / -17.5 %	3
Electrical Fast Transients (EFT) / Bursts			4
Surges			4
Conducted Disturbances, induced by RF-Fields			
via CDN	2	+15.1 / -13.1 %	6
via EM clamp	2	+42.6 / -29.9 %	6
via current clamp	2	+43.9 / -30.5 %	6
Power Frequency Magnetic Field	2	+20.7 / -17.1 %	2
Pulse Magnetic Field			4
Voltage Dips, Short Interruptions and Voltage Variations			4
Oscillatory Waves		a	4
Conducted Low Frequency Disturbances			
Voltage setting	2	± 0.9 %	2
Frequency setting	2	± 0.1 %	2
Electrical Transient Transmission in Road Vehicles			4

Table 17

Note 1:
The expanded uncertainty reported according to CISPR 16-4-2:2003-11 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 2:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 3:
The expanded uncertainty reported according to UKAS Lab 34 (Edition 1, 2002-08) is based on a standard uncertainty multiplied by a coverage factor of kp = 2.05, providing a level of confidence of p = 95.45%
Note 4:
It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95%confidence.
Note 5:
The expanded uncertainty reported according to IEC 61000-4-3 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 6:
The expanded uncertainty reported according to IEC 61000-4-6 is based on a standard uncertainty multiplied by a coverage factor of kp = 2, providing a level of confidence of p = 95.45%
Note 7:
The expanded uncertainty reported according ETSI TR 100 028 V1.4.1 (all parts) to is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%
Note 8:
The expanded uncertainty reported according to ETSI TR 102 273 V1.2.1 (all parts) is based on a standard uncertainty multiplied by a coverage factor of kp = 1.96, providing a level of confidence of p = 95.45%

Product Service